
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project Flathead River Native Species Project (MFWP Sub-proposal)	
BPA project number	9401002
Contract renewal date (mm/yyyy)	10/1999
Multiple actions? (indicate Yes or No)	YES
Business name of agency, institution or organization requesting funding Montana Fish, Wildlife, & Parks	
Business acronym (if appropriate)	MFWP
Proposal contact person or principal investigator:	
Name	Brian Marotz, Rick Malta
Mailing address	490 N. Meridian Road
City, ST Zip	Kalispell, MT 59901
Phone	(406) 751-4546
Fax	(406) 257-0349
Email address	marotz@digisys.net
NPPC Program Measure Number(s) which this project addresses 903(a), 903(b) (NPPC 1987), 10.1B, 10.1C, 10.2A.2, 10.2B, 10.3A.1-4, 10.3A.6, 10.3A9, 10.3A11, 10.3A.18 (NPPC 1995)	
FWS/NMFS Biological Opinion Number(s) which this project addresses Bull Trout ESA Listing (63 FR 31647) Westslope Cutthroat Trout - Petitioned for ESA Listing (63 FR 31691) NMFS Hydrosystem Operations for Salmon and Steelhead Recovery (56 FR 58619;57 FR 14653; 62 FR 43937)	
Other planning document references Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits Stated in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1987-1991 (Marotz and DosSantos 1993), Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1991-1993 (MFWP and CSKT 1997), Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Hungry Horse Dam (MFWP & CSKT 1991), Hungry Horse Dam Fisheries Mitigation Implementation Plan (MFWP & CSKT 1993), Fish Passage and Habitat Improvement in the Upper Flathead River Basin (Knotek et al. 1997), Montana Bull Trout Restoration Plan (Montana Bull Trout Restoration Team 1997), Flathead River Drainage Bull Trout Status Report (Montana Bull Trout Restoration Team 1997), Flathead River Drainage Bull Trout Status Report (Montana Bull trout Scientific Group 1995a), South Fork Flathead River Drainage Bull	

Trout Status Report (Montana Bull Trout Scientific Group 1995b), Montana Westslope Cutthroat Trout Restoration Plan, In Prep), Monitoring Master Plan for the Flathead Basin (Flathead Basin Commission 1985), Flathead Basin Commission Biennial Report 1995-1996 (Flathead Basin Commission 1997), Forest Plan: Flathead National Forest (Brannon 1985), Montana Stream Preservation Act (1963), Natural Streambed and Land Preservation Act (1975), Water Quality Data and Analysis to Aid in the Development of Revised Water Quality Targets for Flathead Lake , Montana (Stanford et al. 1997).

Short description

Protect and enhance native fish by managing the effects of regulated flow and temperature below Hungry Horse Dam on species interactions in the Flathead River. Evaluate effects of thermal control using selective withdrawal. Model macro- and micro-habitats relative to change in flow.

Target species

Bull Trout, Westslope Cutthroat Trout, Mountain Whitefish

Section 2. Sorting and evaluation

Subbasin

Upper Columbia: Flathead

Evaluation Process Sort

CBFWA caucus		CBFWA eval. process		ISRP project type	
X one or more caucus		If your project fits either of these processes, X one or both		X one or more categories	
	Anadromous fish	X	Multi-year (milestone-based evaluation)		Watershed councils/model watersheds
X	Resident Fish	X	Watershed project eval.		Information dissemination
	Wildlife				Operation & maintenance
					New construction
				X	Research & monitoring
				X	Implementation & mgmt
					Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20554	Hungry Horse Dam Fisheries Mitigation (MFWP)
9401002	Flathead River Native Species Project (MFWP)
9101903	Hungry Horse Dam Mitigation - Watershed Restoration & Monitoring (MFWP)
9502500	Flathead River Instream Flow (IFIM) Project (MFWP)
9101901	Hungry Horse Mitigation - Flathead Lake Monitoring & Habitat Enhancement (CSKT)
9101904	Hungry Horse Mitigation - Non-native Fish Removal and Hatchery Production (USFWS)

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9648701	Focus Watershed Coordination-Flathead Basin (BPA)	Serves as liaison between agencies on focus watershed projects.
3874700	StreamNet Geographical Information Services Unit (BPA)	Provides GIS and GPS support for design, modification, and archive of watershed maps resulting from projects 9401002, 9502500, and 9101903.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1995	Completed cooperative culvert improvement project on Margaret Creek, a direct tributary of Hungry Horse Reservoir.	Yes. Opened ~ 3.8 km of high quality habitat. Adfluvial cutthroat redds and juvenile bull trout were found upstream of former culvert barrier.
1995	Completed cooperative sediment source surveys in drainages along Hungry Horse Reservoir containing bull trout spawning and rearing tributaries.	To be determined. Surveys were conducted to provide USFS data necessary to repair identified problems. Repairs are underway.
1995-97	Completed pilot food habits study examining predation of native salmonids by lake trout and northern squawfish in the Flathead River.	Yes - Collected and analyzed > 850 stomachs from predators in Flathead River to estimate species-specific losses to predation.
1996	Completed cooperative culvert improvement project on Murray Creek, a direct tributary of Hungry Horse Reservoir.	Yes. Opened ~ 3.8 km of high quality habitat. Adfluvial cutthroat redds and juvenile bull trout were found upstream of former culvert barrier.
1996	Completed cooperative culvert	Yes. Opened ~ 3.2 km of high quality

	improvement project on Riverside Creek, a direct tributary of Hungry Horse Reservoir.	habitat. Adfluvial cutthroat redds were found upstream of former culvert barrier.
1996	Completed cooperative baseline data collection of bull trout spawning habitat quality and utilization in reservoir and backcountry tributaries of the South Fork Flathead River.	Yes. Data was collected on reservoir tributaries draining managed lands and backcountry tributaries free of management. This data will be used to monitor trends in bull trout abundance and spawning and rearing habitat quality.
1997	Completed cooperative culvert improvement project on Harris Creek, a direct tributary of Hungry Horse Reservoir.	Yes. Opened ~ 2.8 km of high quality habitat. Adfluvial cutthroat redds and juvenile bull trout were found upstream of former culvert barrier.
1997	Completed cooperative culvert improvement project on Felix Creek, a direct tributary of Hungry Horse Reservoir.	Yes. Opened 6.4 km of high quality habitat. Adfluvial cutthroat redds and juvenile bull trout were found upstream of former culvert barrier.
1998	Completed development of radio-telemetry monitoring system for the Flathead River.	To be determined. The successful development of this system advanced the investigation into lake trout use of the Flathead River. It also facilitated extending radio-telemetry to westslope cutthroat and bull trout. Finally, the system allowed for an increase in number of radios/sample size.
1998	Completed construction of Crossover Creek Wetlands Project in cooperation with project 9101903.	To be determined. Biological monitoring is being conducted by project 9101903.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Compile biological information for a model layer correlating macro- and micro-habitats to changes in flow for the Flathead River in cooperation with the Flathead IFIM Project (BPA #9502500).	A	Use radio-telemetry and underwater observation to locate fish and document associated habitat parameters for use in developing weighted useable area curves.
		B	Collect physical data measurements of water temperature, nose velocity, velocity profile, proximity to cover, substrate type, and IFIM cell micro-habitat.

Obj 1,2,3	Objective	Task a,b,c	Task
		C	Provide radio-locations from tagged lake trout, bull trout, westslope cutthroat trout, and other species for use in mapping species seasonal distribution.
		D	Correlate fish locations with season, flow, temperature, species, substrate type, depth, and distance from shore.
		E	Correlate occurrence of aquatic insects with substrate type mapping.
		F	Analyze fish food habits relative to season, flow, and temp conditions.
2	Complete assessment of lake trout relative seasonal abundance, distribution, and movements in the Flathead River.	A	Capture lake trout using traps, angler harvest, angling, and electrofishing apparatus.
		B	Surgically implant radio-transmitters into lake trout to monitor movements. A maximum of 50 radio-tagged fish will be maintained in the system for the duration of this objective.
		C	Maintain three radio-telemetry ground stations along the Flathead River to monitor directional movements of radio-tagged fish.
		D	Collect additional data on lake trout distribution, movements, and habitat use through weekly aerial surveys of radio-tagged fish.
		E	Correlate flows and water temperatures with the occurrence of lake trout.
		F	Pump stomachs of fish captured for radio-tagging and collect stomachs from fish harvested by anglers to obtain food habits. Collect age and growth information (lengths/weights, scales/otoliths) from fish harvested by anglers.
3	Monitor native fish distribution, movements, and habitat use in the Flathead River.	A	Capture sub-adult bull trout and adult and sub-adult westslope cutthroat trout using passive traps, angling, electrofishing apparatus, or other non-

Obj 1,2,3	Objective	Task a,b,c	Task
			lethal means.
		B	Surgically implant radio-transmitters into captured bull trout and westslope cutthroat trout to monitor movements. A maximum of 35 radio-tagged bull trout and 30 radio-tagged westslope cutthroat trout will be maintained in the system for the duration of this objective.
		C	In conjunction with lake trout monitoring, maintain three radio-telemetry ground stations along the Flathead River to monitor movements of radio-tagged fish.
		D	In conjunction with lake trout monitoring, collect additional data on fish distribution, movements, and habitat use through weekly aerial surveys of radio-tagged fish.
		E	Correlate flows and water temperatures with seasonal movements and distribution of bull trout and westslope cutthroat trout.
		F	Correlate bull trout/ westslope cutthroat trout/lake trout movements, distribution, and habitat use.
4	Complete assessment of predation by northern pike on native fish in the main stem Flathead River.	A	Capture northern pike using traps, angling, angler harvest, electrofishing apparatus, or other means.
		B	Surgically implant radio-transmitters into northern pike to monitor movements. A maximum of 30 radio-tagged fish will be maintained in the system for the duration of this objective.
		C	In conjunction with other radio-telemetry monitoring flights, collect data on fish distribution, movements, and habitat use through weekly aerial surveys of radio-tagged fish.
		D	Pump stomachs of fish captured for radio-tagging and collect stomachs from fish harvested by anglers to

Obj 1,2,3	Objective	Task a,b,c	Task
			obtain food habits. Collect age and growth information (lengths/weights, scales/otoliths) from fish harvested by anglers.
5		E	Correlate northern pike/bull trout/westslope cutthroat trout movements and habitat use.
	Complete assessment of rainbow trout threat to native westslope cutthroat trout in the upper main stem, north fork, and middle fork of the Flathead River.	A	Cooperate on radio telemetry portion of University of Montana graduate study examining interactions of rainbow trout and westslope cutthroat trout in the Flathead System with project 9101903.
		B	Capture rainbow trout using traps, angling, angling harvest, electrofishing apparatus, or other means.
		C	Surgically implant radio-transmitters into rainbow trout to monitor movements. A maximum of 40 radio-tagged fish will be maintained in the system for the duration of this objective.
		D	Obtain data on rainbow trout movements from three radio-telemetry ground stations along the Flathead River collected in conjunction with other species monitoring.
		E	Collect additional data on rainbow trout distribution, movements, and habitat use through periodic aerial surveys of radio-tagged fish.
6	Conduct westslope cutthroat trout population surveys in the Flathead System in cooperation with MFWP management staff and Project 9101903.	A	Conduct mark-snorkel population estimates for westslope cutthroat trout in the south, middle and north forks of the Flathead River.

Objective schedules and costs

Obj #	Start date	End date mm/yyyy	Measurable biological objective(s)	Milestone	FY2000 Cost %
--------------	-----------------------	-----------------------------	---	------------------	--------------------------

	mm/yyyy				
1	04/98	04/2003	Complete model of biological attributes associated with macro- and micro-habitats in IFIM.	X	25
2	01/95	12/2000	Identify lake trout distribution, movements, and habitat preference in main stem Flathead River.	X	20
3	11/97	09/2003	Identify bull trout and cutthroat trout distribution, movements, and habitat preference in Flathead River.	X	20
4	05/97	12/2000	Determine levels of northern pike predation on native fish in Flathead River.	X	15
5	10/99	10/2002	Identify timing and locations of rainbow trout spawning in tributaries.	X	15
6	07/97	NA: On-going	Monitor Flathead River westslope cutthroat trout populations .		5
				Total	100

Schedule constraints

Achievement of stated objectives on schedule is dependent upon the subcontracting processes, permitting processes, unanticipated BPA schedule and timeline changes and major weather events. Project schedule changes are the norm rather than the exception due to many variables beyond our control making prioritization of tasks an adaptive process. Some objectives proceed more quickly than anticipated and others more slowly. We must proceed on many projects simultaneously to assure a continuous series of completed tasks. It is anticipated this project will proceed on schedule.

Completion date

FY2002

Section 5. Budget

FY99 project budget (BPA obligated):	\$248,435
---	------------------

FY2000 budget by line item

Item	Note	% of total	FY2000 (\$)
Personnel	4.0 FTE	35.6%	\$95,157
Fringe benefits		11.7%	31,213
Supplies, materials, non-expendable property	Field sampling, radio-telemetry, monitoring, gasoline, lab supplies.	5.1%	13,570
Operations & maintenance	Communications, rent, equipment repair and maintenance.	13.2%	35,224
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Radio-transmitters (75), one data logging receiver and associated equipment.	10.5%	28,125
NEPA costs			0
Construction-related support			0
PIT tags	# of tags:		0
Travel	Mileage (13,750 miles @ .31/mile); per diem (40 nights @ \$12/day, 45 days @ \$23/day, 315 employee days @ \$12/day	3.6%	9558
Indirect costs	Overhead 17 %. Minus equipment	14.5%	38,802
Subcontractor	Food habits analysis: 400 stomachs @ \$8.50 ea.	1.2%	3400
Other	Graduate student research stipend and radio-telemetry equipment.	4.5%	12,000
TOTAL BPA REQUESTED BUDGET			267,049

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
MFWP Management Staff	Annual watershed fish and habitat monitoring.	1.1%	3000
Total project cost (including BPA portion)			270,049

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	285,000	285,000	NA	NA

Section 6. References

Watershed?	Reference
X	Brannon, E.B. 1985. Forest Plan: Flathead National Forest. United States Forest Service, Kalispell, Montana.
	Carty, D., W. Fredenberg, L. Knotek, M. Deleray and B. Hansen. 1997. Hungry Horse Dam Mitigation: Kokanee stocking and monitoring in Flathead Lake. Annual progress report-1996. BPA project numbers 9101901, 9101903, and 9101904. Submitted to Bonneville Power Administration. 35pp.
	Christenson, D.J., R.L. Sund and B. Marotz. 1996. Hungry Horse Dam's successful withdrawal system. Hydro Review/May 1996. XV(3):10-15.
	Council. 1987. Northwest Power Planning Council Fish and Wildlife Program.
	Council. 1994. Northwest Power Planning Council Fish and Wildlife Program.
	Courtois, L.A. 1981. Lightweight, adjustable and portable surgical table for fisheries work in the field. Progressive Fish-Culturist 43:55-56.
	Dalbey, D., J. DeShazer, L. Garrow, G. Hoffman and T. Ostrowski. 1997. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries: methods and data summary, 1988-1996. DRAFT report to Bonneville Power Administration. 70pp.
	Deleray, M., T. Weaver and W.L. Knotek. 1997. Statewide fisheries investigations: survey and inventory of coldwater and warmwater ecosystems. V-a. July 1, 1995 through June 30, 1996. Montana Fish, Wildlife and Parks, Kalispell, Montana.
	Deleray, M., W. Fredenberg, and B. Hansen. 1995. Kokanee stocking and monitoring, Flathead Lake-1993 and 1994. BPA Project No. 91-19. Montana Fish, Wildlife and Parks, Kalispell, Montana. Submitted to Bonneville Power Administration. 46pp.
	Everhart, W. H., A. W. Eipper and W. D. Youngs. 1975. Principles of Fisheries Science. Cornell University Press, Ithaca, NY.
X	Flathead Basin Commission. 1995. Monitoring master plan for the Flathead Basin. Kalispell, Montana.
	Flathead Basin Commission. 1997. Biennial report: 1995-96. Kalispell, Montana.
X	Fraley, J., B. Marotz, J. Decker-Hess, W. Beattie and R. Zubik. 1989. Mitigation, compensation, and future protection for fish populations by hydropower development in the in the upper Columbia System, Montana, U.S.A. Regulated Rivers: Research & Management 3:3-18.
	Hansen, B., J. Cavigli, M. Deleray, W. Fredenberg, and D. Carty. 1996. Hungry Horse Dam fisheries mitigation: kokanee stocking and monitoring in Flathead Lake-1995. BPA Project numbers 91-19-01, 91-19-03, 91-19-04. Confederated Salish and Kootenai Tribes, Pablo, Montana. Submitted to Bonneville Power Administration. 25pp.
	Hart, L. G., and R. C. Summerfelt. 1975. Surgical procedures for implanting ultrasonic transmitters in flathead catfish(<i>Polyodictis olivaris</i>). Transactions of the American Fisheries Society 104:56-59.
X	Hauer, F. R., J. T. Gangemi and J. A. Stanford. 1994. Long-term influence of Hungry Horse Dam operation on the ecology of macrozoobenthos of the Flathead

	River. Prepared for Montana Fish, Wildlife and Parks, Special Projects Bureau, Kalispell, Montana.
	Heezen, K. L., and J. R. Tester. 1967. Evaluation for radio tracking by triangulation with special reference to deer movements. <i>Journal of Wildlife Management</i> 31:124-141.
	Henderson, H. F., A. D. Hasler, and G. G. Chipman. 1966. An ultrasonic transmitter for use in studies of movements of fishes. <i>Transactions of the American Fisheries Society</i> 95(4):350-356.
	Hungry Horse Implementation Group. 1994. Hungry Horse dam Fisheries Mitigation Biennial Report, 1992-1993. Prepared for Bonneville Power Administration. 15pp.
	ISAB. 1997. Ecological impacts of the flow provisions of the Biological Opinion for endangered Snake River salmon on resident fishes in the Hungry Horse, and Libby systems in Montana, Idaho, and British Columbia. Independent Scientific Advisory Board. Report 97-3 for the Northwest Power Planning Council and National Marine Fisheries Service. Portland, OR.
	Johnson, J.H. 1971. Fish-borne transmitters. <i>Underwater Telemetry Newsletter</i> 1(2):1,3-4.
X	Knotek, W. L., M. Deleray, and B. Marotz. 1997. Fish passage and habitat improvement in the upper Flathead River Basin. Montana Fish, Wildlife and Parks, Kalispell, Montana. Prepared for Bonneville Administration. 60pp.
	Malta, P. R., S. F. Glutting, R. G. Hunt, W. L. Knotek, B. L. Marotz. 1997. Mitigation for excessive drawdowns at Hungry Horse Reservoir. Ann. Rept., FY95-FY97. MFWP, Kalispell. 117p.
	Malta, P. R., S. F. Glutting, R. G. Hunt, W. L. Knotek, B. L. Marotz. 1998. Mitigation for Excessive drawdowns at Hungry Horse Reservoir. Ann. Rept., FY98. MFWP, Kalispell. (In prep)
	Marotz, B. and J. DosSantos. 1993. Fisheries losses attributable to reservoir drawdown in excess of limits stated in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams. Montana Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes. Proposal to Bonneville Power Administration for the Period 1987 through 1991.
X	Marotz, B. And J. Fraley. 1986. In stream flows needed for successful migration and rearing of rainbow and westslope cutthroat trout in selected tributaries of the Kootenai River. Montana Fish, Wildlife and Parks for Bonneville Power Administration. 137pp.
X	Marotz, B., B. Hansen and S. Tralles. 1988. In stream flows needed for successful migration and rearing of rainbow and westslope cutthroat trout in selected tributaries of the Kootenai River. Montana Fish, Wildlife and Parks for Bonneville Power Administration. 137pp.
X	Marotz, B., D. Gustafson, C. Althen, and B. Lonon. 1996. Model development to establish Integrated Operation Rule Curves for Hungry Horse and Libby Reservoirs, Montana. Montana Fish, Wildlife and Parks report for Bonneville Power Administration, Portland, OR DOE/BP-92452-1. 114pp.
	Marotz, B. L., C. L. Althen, and D. Gustafson. 1994. Hungry Horse Mitigation: aquatic modeling of the selective withdrawal system - Hungry Horse Dam,

	Montana. Montana Department of Fish, Wildlife and Parks. Prepared for Bonneville Power Administration. 36pp.
	Marty, G. D., and R.C. Summerfelt. 1986. Pathways and mechanisms for expulsion of surgically implanted dummy transmitters from channel catfish. Transactions of the American Fisheries Society 115:577-589.
	May, B., S. Glutting, T. Weaver, G. Michael, B. Marotz, P. Suek, J. Wachsmuth and C. Weichler. 1988. Quantification of Hungry Horse Reservoir water levels to maintain or enhance reservoir fisheries. Montana Department of Fish, Wildlife and Parks, Kalispell Montana. Annual report prepared for Bonneville Power Administration. 68pp.
X	Montana Bull Trout Restoration Team. 1997. Montana bull trout restoration plan. Prepared for Montana Fish, Wildlife and Parks, Helena, Montana.
X	Montana Bull Trout Scientific Group. 1995a. Flathead River drainage bull trout status report. Prepared for the Montana Bull Trout Restoration Team. 49pp.
X	Montana Bull Trout Scientific Group. 1995b. South Fork Flathead River drainage bull trout status report. Prepared for Montana Bull Trout Restoration Team. 33pp.
X	MDFWP, CSKT and KTOI. 1997. Fisheries mitigation and implementation plan for losses attributable to the construction and operation of Libby Dam. Prepared for Bonneville Power Administration. Project No. 83-467.
X	Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribe. 1991. Fisheries mitigation plan for losses attributable to the construction and operation of Hungry Horse Dam. Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribe, Kalispell and Pablo, Montana. 71pp.
X	Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes. 1993. Hungry Horse Dam fisheries mitigation implementation plan. Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribe, Kalispell and Pablo, Montana, 43pp.
	Montana Department of Fish, Wildlife and Parks and Confederated Salish and Kootenai Tribes. 1997. Fisheries losses attributable to reservoir drawdown in excess of limits in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1991-1993.
X	Montana Westslope Cutthroat Trout Recovery Team. In Preparation. Montana westslope cutthroat trout recovery plan. Prepared for Montana Fish, Wildlife and Parks, Helena, Montana.
	Morton, W. M. 1955. Report on field trip, June 13 to 17, 1955, to study culverts blocking spawning cutthroat trout in Hungry Horse Reservoir, Montana. MFWP file report. 18pp. (Photos included).
	Muench, B. 1958. Quinaldine, a new anesthetic for fish. Progressive Fish-Culturist 20(1):42-44.
	Mulford, C. J. 1984. Use of surgical skin stapler to quickly close incisions in striped bass. North American Journal of Fisheries Management 4:571-573.
X	Read, D., B. B. Shepard, and P. J. Graham. 1982. Fish and habitat inventory of streams in the North Fork Drainage of the Flathead River. Flathead River Basin Environmental Impact Study. Prepared for Montana Fish, Wildlife and Parks, Kalispell, Montana for the Environmental Protection Agency. 181pp.

	Ross, M. J., and J. H. McCormick. 1981. Effects of external radio transmitters on fish. <i>Progressive Fish-Culturist</i> 43:67-72.
	Schramm, H. L., Jr., and D. J. Black. 1984. Anesthesia and surgical procedures for implanting radio transmitters into grass carp. <i>Progressive Fish-Culturist</i> 46:185-190.
	Snelson, S., C. Mulfield and B. Marotz. 1997. Mitigation for excessive drawdown at Libby Reservoir. DRAFT Annual Report 1996. BPA Project number BPA 94-10.
X	Stanford, J. A., B. K. Ellis, J. A. Craft and G. C. Poole. 1997. Water quality data and analyses to aid in the development of revised water quality targets for Flathead Lake, Montana. Report prepared for the Flathead Basin Commission, Kalispell, Montana.
	Stasko, A. G. 1971a. Bibliography of underwater telemetry in biological applications. <i>Underwater Telemetry Newsletter</i> 1(1):6-9.
	Stasko, A. G. 1971b. People and projects in underwater telemetry. <i>Underwater Telemetry Newsletter</i> 1(2):5-14.
	Stasko, A. G. 1971c. Review of field studies on fish orientation. <i>Annals New York Academy of Science</i> 188:12-29.
	Summerfelt, R. C. and L. Hart. 1972. Performance evaluation of a 74 kilocycle second transmitter for behavioral studies on reservoir fishes. <i>Proceedings of the Southeast Association Game and Fish Commission</i> 25(1971):607-622.
X	Weaver, T. M., and J. J. Fraley. 1991. Fisheries habitat and fish populations. Flathead Basin Forest Practices Water Quality and Fisheries Cooperative Program, Flathead Basin Commission, Kalispell, Montana. 47pp.
	Weaver, T. M., and J. J. Fraley. 1993. A method to measure emergence success of westslope cutthroat trout fry from varying substrate compositions in a natural stream channel. <i>North American Journal of Fisheries Management</i> 13:817-822.
X	Weaver, T. M., J. J. Fraley, and P. J. Graham. 1983. Fish and habitat inventory of streams in the Middle Fork of the Flathead River. Flathead River Basin Environmental Impact Study. Prepared for Montana Department of Fish, Wildlife and Parks, Kalispell Montana for the Environmental Protection Agency. 229pp.
	Williams, D. F., and R. Roaf. 1973. <i>Implants in surgery</i> . Saunders, Philadelphia.
	Winter, J. D. 1983. Underwater Biotelemetry. Pages 371-396 in L. A. Nielsen and D. L. Johnson, editors, <i>Fisheries Techniques</i> . American Fisheries Society, Bethesda, Maryland.
	Zimmerman, F., and C. Bercy. 1981. Effets de la fixation interne d'émetteurs de tracking chez la truite. [Effects of internal tracking transmitters on behavior of trouts] <i>Acta Oecologica Applicata</i> 2:49-62.
	Zippen, C. 1956. An evaluation of the removal method of estimating animal populations. <i>Biometrics</i> 12:163-169.

PART II - NARRATIVE

Section 7. Abstract

The purpose of this project is to quantify the influence of regulated flow and temperature on fish in the Flathead River, as they relate to risks posed by non-native fish to native fish. Native bull trout (threatened under ESA) and westslope cutthroat trout (petitioned for listing) are being impacted by predation and genetic introgression, which interact with dam operation and other anthropogenic factors causing population declines. This project executes research and mitigative actions designed to improve survival and growth of these fish species. Biological research in the Flathead River will correlate seasonal distribution, movements and predator-prey interactions with river flow and temperature. The project will provide a biological layer for overlay on the physical framework river model provided by the Flathead River Instream Flow Project (BPA 9502500). Macro- and micro-habitat parameters associated with fish locations form the basis for weighted usable area curves. Predator/prey interactions focus on seasonal food habits of lake trout, northern pike, and northern squawfish. Results from these objectives complement and extend related IFIM and thermodynamics modeling (projects 9402500 and 8346500) and Hungry Horse Mitigation Watershed Restoration Program (project 9101903).

Section 8. Project description

a. Technical and/or scientific background

See Umbrella Proposal for Hungry Horse Fisheries Mitigation.

b. Rationale and significance to Regional Programs

See Umbrella Proposal for Hungry Horse Fisheries Mitigation. The Columbia Basin Fish and Wildlife Program 10.3A.18 directs BPA to fund an IFIM-based instream flow project in the Flathead River downstream of Hungry Horse Dam. Results will define IRCs for Hungry Horse Reservoir and strengthen tools needed by decision makers to balance the requirements of fish in the reservoir and river.

c. Relationships to other projects

See Umbrella Proposal for Hungry Horse Fisheries Mitigation.

d. Project history

This is an ongoing mitigation program, formally BPA Project 94-10 entitled Mitigation for Excessive Drawdowns at Hungry Horse and Libby Reservoirs. It has been underway since December 1994. The project number was changed in 1997 to 9401000, the title remained the same. In 1998, Hungry Horse and Libby components were divided into separate projects with individual project numbers. The Hungry Horse component (this project) became BPA 9401002 and the name was changed to the Flathead River Native Species Project. Past annual costs were: \$148,722 (FY95), \$131,218 (FY96), \$323,178 (FY97), and \$226,736 (FY 98). Project reports include the mitigation for excessive drawdowns at Hungry Horse Reservoir 1995-1996 biennial report and the mitigation for excessive drawdowns at Hungry Horse Reservoir 1997 annual report (In Prep.).

This project began as a result of language in the 1987 Fish and Wildlife Program (measures 903(a) and (b), and 903(b)(1)(D)) which stated that if drawdown limits were exceeded for power purposes (85 feet at Hungry Horse and 90-110 feet at Libby), BPA shall fund the mitigation of fishery losses caused by reservoir drawdowns in excess of the limits. In 1995, the Fish and Wildlife Program was amended to adopt and implement Integrated Rule Curves (IRC) at Hungry Horse and Libby Dams (10.3A.3,4 and 6-9). The earlier drawdown limits remain in effect until the IRCs are implemented. MFWP and CSKT proposed a program to mitigate damages to the fishery resources in Hungry Horse and Libby Reservoirs sustained during the period 1987 through 1991 (MFWP and CSKT 1993). BPA agreed to fund a three year project that began in November

1994. Funding was provided by BPA Power Supply rather than Fish and Wildlife Program dollars. Thus, this project has been funded under a different process than projects funded under the Fish and Wildlife Program.

The established drawdown limits were again exceeded for power purposes after the original excessive drawdown mitigation proposal was submitted to BPA. Record breaking drawdowns occurred in two years at Hungry Horse (1993, a 188-ft drawdown; 1994, a 173.8-ft drawdown) and a deep draft (1993, a 136-ft drawdown) occurred at Libby Reservoir. MFWP and CSKT documented fishery losses incurred by these extreme reservoir drawdowns and requested BPA fund mitigative actions (MFWP and CSKT 1997). The initial year of the project (FY98) was funded by Power Supply. Funding for future years will be reviewed and prioritized under the Fish and Wildlife Program (Bob Lohn, BPA personal communications and contract stipulation).

Past activities and accomplishments have covered a broad range of objectives. These include cooperative fish passage and habitat projects, watershed assessments, predator food habits studies on the Flathead River, and fish and habitat monitoring (see accomplishments in section 4). Currently, the project has begun to correlate the influence of regulated flow and temperature on native/non-native fish interactions in the mainstem Flathead River. This is part of an adaptive process to integrate projects under the Hungry Horse Mitigation Umbrella (MFWP) for greater efficiency. Integration of the sub-projects allows MFWP to comprehensively address operational and non-operational impacts in the Flathead Basin.

e. Proposal objectives

1. Compile biological information for a model layer correlating macro- and micro-habitats to changes in flow for the Flathead River in cooperation with the Flathead IFIM Project (BPA #9502500).

This objective is scheduled to begin in April of 1999 and will end April 2003. Completion of this objective will enable us to predict species distribution, movements, and habitat use due changes in flow and temperature caused by releases from Hungry Horse Dam. Results of this objective will be published in a report to BPA and peer reviewed journals. This report will be available to all interested agency and citizen groups.

2. Complete assessment of lake trout relative seasonal abundance, distribution, and movements, in the Flathead River.

This objective began in January 1995 and will end December 2000. Radio-transmitters will be deployed until December 1999. Data on distribution will be collected until December 2000. Results obtained from this objective will assess the extent of predation by non-native lake trout on native fish and measure the influence of selective withdrawal (thermal variation) on lake trout in the Flathead River. Results of this objective will be published in a report to BPA and peer reviewed journals. This report will be available to all interested agency and citizen groups.

3. Monitor native fish distribution, movements and habitat use in the Flathead River.

This objective began November 1997 and will end September 2003. Radio-transmitters will be deployed until September 2002. Data on distribution will be collected until September 2003. Results obtained from this objective will measure the extent of species interactions and habitat overlap of bull trout and westslope cutthroat trout with non-native predators. Results of this objective will be published in a report to BPA and peer reviewed journals. This report will be available to all interested agency and citizen groups.

4. Complete assessment of predation by northern pike on native fish in the main stem Flathead

River.

This objective began in May 1997 and will end December 2000. Radio-transmitters will be deployed until November 1999. Data on distribution will be collected until December 2000. Results obtained from this objective will measure the extent of species interactions and habitat overlap of bull trout and westslope cutthroat trout with non-native predators. Results of this objective will be published in a report to BPA and peer reviewed journals. This report will be available to all interested agency and citizen groups.

5. Complete assessment of rainbow trout threat to native westslope cutthroat trout in the upper main stem, north fork, and middle fork of the Flathead River.

This objective will begin in October 1999 and will end October 2002. Radio-transmitters will be deployed until October 2001. Data on distribution will be collected until October 2002. Project personnel will continue this objective beyond the completion of the graduate project which is anticipated to be October 2001. Results obtained from this objective will identify rainbow trout spawning sites and will be correlated with westslope cutthroat trout spawning sites. This information will indicate the level of potential hybridization between the two species. Results of this objective will be published in a report to BPA, peer reviewed journals, and master thesis. These reports will be available to all interested agency and citizen groups.

6. Conduct westslope cutthroat trout population surveys in the Flathead System in cooperation with MFWP management staff and project 9101903.

This objective began in July 1997 and will be an on-going annual objective. Results obtained from this objective will be used to measure the status of westslope cutthroat trout populations. Results of this objective will be published in a report to BPA. This report will be available to all interested agency and citizen groups.

f. Methods

Objective 1.

Study Design:

The Flathead River has been stratified into distinct reach breaks based on gradient, inflowing tributaries, and channel morphometry. Reach 1 extends from the confluence with the South Fork Flathead River to a gradient break above the Stillwater River confluence. Reach 2 extends through a low gradient, braided section to the point where the channels rejoin into one channel. Reach 3 is downstream of the braided section and ends at the gradient break where Flathead Lake begins to influence river stage (full pool elevation 2893 ft msl). The segments were further divided based on channel stability, sinuosity and substrate types. High resolution aerial photography will be used to update a GIS map of the Flathead. Areas of rapid change will be stratified separately. Sampling of fish and zoobenthos will be stratified on season, flow and temperature.

Parameters:

The overall goal of the project is to quantify the influence of flow and water temperature on fish seasonal occurrence, movements and species interactions. The two parameters are manageable through dam operation and selective withdrawal thermal control, and are the dominant factors influencing all other parameters under investigation. These include: substrate type, focal velocity as it relates to column velocity, depth and proximity to cover. Zoobenthos will be grossly linked to substrate type and channel location.

Analysis:

Each of the parameters listed above are habitat categories to be analyzed using Chi Square and MANOVA with canonical analysis. Measurements will quantify the total availability of each

habitat category.

H₀: Habitat use of each species and fish size strata is proportional to the total availability of each habitat category.

H_a: Habitat use is not in proportion to the total availability of each habitat category.

Some details will be decided through negotiation with the successful contractor selected by BPA to complete the Flathead Instream Flow (IFIM) Project (9502500) currently in RFM process.

Objective 2,3,4,5

Radio-telemetry will entail using radio transmitters to track the movements of adult lake trout, juvenile and sub-adult bull trout, sub-adult and adult westslope cutthroat trout, sub-adult and adult rainbow trout, and northern pike within the Flathead River system. The main assumption is that tagged and non-tagged fish behave similarly. The surgical sequence occurs as follows: fish are capture by angling or netting, determined to be in good condition, anesthetized in a solution of ms-222, measured and weighed, a scale sample is taken, the fish's gills are kept in ms-222, a 50mm incision is made in the ventral side of the fish longitudinally from just anterior of the pelvic fins up toward the head, a large-diameter hypodermic needle is inserted anteriorly through the skin into the body cavity posterior to the pelvic fins, the 30cm long wire radio-antenna is inserted into the end of the needle while the needle is still in the body cavity, the needle is then withdrawn and the antenna extends posteriorly outside the body cavity, the radio is implanted in the body cavity, surgical staples are used to initially close the incision, sutures are then used to fully close the incision, betadine solution is applied to cleanse the outside of the incision, finally the fish is placed in fresh water to recover before release.

The number of lake trout with radios will be limited to 50; reasoning for this number was determined in part by the cost of the transmitters (~\$215 each), the capacity and usefulness of the radio receiver for locating fish, and the size of the river system. Lake trout must be >445g. The number of bull trout with radios will be limited to 35. Ten bull trout radios may be used in juveniles (<120g) that are emigrating from spawning streams, and the remainder will be used in sub-adults (445-1360g) that are inhabiting the main stem Flathead River. Thirty westslope-cutthroat trout will be radio-tagged; a maximum of 10 radios will be implanted into adult cutthroat (>445g) and the remainder will be implanted into sub-adult cutthroat (150-260g). A maximum of 30 radios will be used to monitor northern pike (>800g) in the lower Flathead River. Finally, 30 sub-adult (150-260g) and adult (<445g) rainbow trout will be radio-tagged.

Radio tracking will be accomplished with a Lotek data-logging receiver via weekly airplane flights and permanent ground stations (PSTs) set up along the Flathead river to record fish passage.

PSTs record fish passage, time and date; this data is downloaded weekly into a laptop computer.

PST data will cut down on the cost of unnecessary flights over sections of river that are void of radio-implanted fish. If an aerial survey covers the study area and does not pick up all implanted fish, it is assumed that the undetected transmitters are outside the study area. Locations of implanted fish are recorded on a Corvallis Microtechnology Global Positioning System (MC-GPS). This unit integrates a hand held computer with a GPS. The radio-telemetry location data are then downloaded onto a MC-GPS mapping program that is installed on a personal computer. Data points are then graphically represented on a map of the Flathead River System and can be used to calculate distances traveled by implanted fish between monitoring dates.

Food habits will be collected from lake trout and northern pike found in the river. This entails using angling, netting and creeling methods to obtain fish. Fish that are harvested by anglers will have the entire stomach section removed intact, slit open and placed in plastic sample jars.

Stomach contents of fish that will be radio-tagged and released will be obtained by use of a stomach pump. This method is utilized for its non-lethal sampling, allowing stomach contents to be collected without sacrificing the fish. The apparatus consists of a small 12-volt bilge pump mounted in the bottom of a water-filled 20 liter bucket. A small diameter plastic tube attached to the pump is slid into the anesthetized fishes stomach through the mouth. Water pressure forces the stomach contents out through the mouth into a plastic bowl with small-mesh (90 openings/linear cm) screened bottom to extract the sample. The fish are then placed in a large tub of fresh water and observed until it recovered from the anesthesia before release. The stomach contents are then rinsed into a glass Mason jar via a canning funnel with a 95 percent ethanol solution. The sample is decanted by sieving to fit into a standard snap-top plastic vile or Nalgene bottle and labeled. Labels with pertinent information and a solution of 95% ethanol are placed in the jar. Samples are kept in storage until winter, when there is time for laboratory analysis. Diet items are separated and keyed out as far as distinguishing marks allow, using a dissecting scope. Similar species are enumerated, and each item is measured for length and wet weight. The data is then entered into a computer spreadsheet/database. Frequency of occurrence is then calculated to show trends in prey selection and preference.

Objective 6.

Westslope cutthroat trout population-estimates will be accomplished using standard fisheries mark-recapture techniques. A section of stream is marked, and fish are angled from the section for a specific time period. Each fish is marked using either a floy or ribbon tag and immediately released back into the water. A 24-hour period of time is allowed for the fish to redistribute within the section. Snorkeling is then used to visually “recapture” the fish within the section. Estimates can then be calculated and compared to previous seasons. Assumptions include; marked fish, during the period between release and recapture, suffer no greater mortality nor emigrate further than unmarked fish; no marks are lost nor are any marked fish overlooked; marked fish are “caught” at the same rate as unmarked fish; marked fish are randomly distributed or if not, the recaptures are; that there will have been no additions to the population (Everhart et al, 1975). These sections of stream are within the Bob Marshall and Great Bear Wilderness systems. The remote aspect of the area and restriction on mechanical devices within the wilderness preclude using other sampling techniques.

g. Facilities and equipment

See Umbrella Proposal for Hungry Horse Fisheries Mitigation.

h. Budget

The amount requested for FY2000 is \$18,614 more than the amount for FY1999. Total personnel costs increased by \$40,765 due to the addition of a full-time biologist to the project. This addition was in response to the increase complexity of the project as well as the comments made during the FY1999 project proposal process by the ISRP that the FTE for this project was low for the amount of work being proposed. Supplies and materials costs increased by \$1,315 primarily due to the increase in radio-telemetry work. Operations and maintenance costs increased by \$7,884 due to an increase in the aircraft rental rate as well as an increase in the number of flights necessary to monitor an increase in the number of radio-tags to be depolyed. Another comment by the ISRP was that the number of radio-tags/sample size was too small. The increase in the number of radio-tags reflects the increase in equipment of \$6,525. Indirect costs or overhead of 17% is set by the State of Montana and the increase of \$5,512 reflects an increase in the total budget amount requested. The final increase is \$12,000 for the graduate student

stipend and associated radio-telemetry equipment and supplies. These increases total \$74,001 over last years budget. This amount is off-set by reductions in travel (\$3,087) and subcontractors (\$52,300). These reductions total \$55,387 and off-set 75% of the increases itemized above. This brings the total requested increase over FY1999 to only \$18,614.

Section 9. Key personnel

Project Manager: Patrick R. Malta **Title: Fish & Wildlife Technician** **FTE: 1.0**

Project Duties: Write project proposals and grant applications; determine project direction and develop work plans and schedules by prioritizing tasks to meet contractual obligations; develop yearly budgets and monitor monthly budget analysis reports; write quarterly and yearly progress reports; write employee performance appraisal criteria and conduct performance evaluations. Work independently with minimal supervision conducting fisheries research on Flathead River and associated waters. Identifies and implements selected fish habitat and passage improvement projects. Supervise two Fish and Wildlife Technicians.

Qualifications: BS Degree. Fish and Wildlife Conservation major, Biology minor, and an additional twenty semester hours in business administration. Forty-eight (48) semester hours post graduate continuing education in Fish and Wildlife Management. Six plus years experience in fisheries with FWP and USFWS. Six plus years experience in wildlife with FWP. Two plus years experience in forestry with USFS and SCS. Interim project manager for the Northwest Montana Wildlife Habitat Enhancement: Hungry Horse Elk Mitigation Project in 1993. Project manager for Hungry Horse Dam Excessive Drawdown Mitigation Project since 1994.

Education: B.S. Conservation - Northern Michigan University 1980
 Fish & Wildlife Management Classes - University of Montana 1982-1984
 Computer and Business Classes - Flathead Valley Community College 1988,1997

Current Employer:

11/94 to present	Fish and Wildlife Tech.	Montana Fish, Wildlife and Parks	Kalispell, MT
------------------	-------------------------	----------------------------------	---------------

Previous Employment:

10/88 to 11/94	Wildlife Research Asst.	Montana Fish, Wildlife and Parks	Kalispell, MT
07/88 to 10/88	Fisheries Fieldworker	Montana Fish, Wildlife and Parks	Kalispell, MT
04/88 to 07/88	Wildlife Research Aid	Montana Fish, Wildlife and Parks	Kalispell, MT
11/87 to 03/88	Fisheries Fieldworker	Montana Fish, Wildlife and Parks	Kalispell, MT
04/87 to 10/87	Fisheries Fieldworker	Montana Fish, Wildlife and Parks	Kalispell, MT
05/86 to 11/86	Fisheries Fieldworker	Montana Fish, Wildlife and Parks	Kalispell, MT

Publications:

Casey, D., and P.R. Malta. 1990. Hungry Horse Dam wildlife habitat enhancement project. Long-term habitat management plan, elk and mule deer winter range enhancement, Firefighter Mountain and Spotted Bear winter ranges. MFWP, Kalispell, and Bonneville Power Admin., Portland, OR. 89p.

Casey, D., and P.R. Malta. 1990. Northwest Montana wildlife habitat enhancement: Hungry Horse elk mitigation project. Interim Rept. MFWP, Kalispell. 85p.

Casey, D., and P.R. Malta. 1990. Northwest Montana wildlife habitat enhancement: Hungry Horse elk mitigation project. Monitoring and evaluation plan. Montana Dept. Fish, Wildl. And Parks, Kalispell. 56p.

Casey, D., and P.R. Malta. 1991. Northwest Montana wildlife habitat enhancement: Hungry Horse elk mitigation project. Ann. Rept., FY91. MFWP, Kalispell. 65p.

Casey, D., and P.R. Malta. 1992. Northwest Montana wildlife habitat enhancement: Hungry Horse elk mitigation project. Ann. Rept., FY92. MFWP, Kalispell. 66p.

Vore, J., and P.R. Malta. 1993. Northwest Montana wildlife habitat enhancement: Hungry Horse elk mitigation project. Ann. Rept., FY93. MFWP, Kalispell. 62p.

Vore, J., P.R. Malta, E. Schmidt. 1994. Hungry Horse habitat mitigation project. Ann. Rep., FY94. MFWP, Kalispell. 55p.

Malta, P.R., S. F. Glutting, R. G. Hunt, W. L. Knotek, B. L. Marotz. 1997. Mitigation for excessive drawdowns at Hungry Horse Reservoir. Ann. Rept., FY95 and FY96. MFWP, Kalispell. 117p.

Malta, P. R., S. F. Glutting, R. G. Hunt, W. L. Knotek, B. L. Marotz. 1998. Mitigation for excessive drawdowns at Hungry Horse Reservoir. Ann. Rept., FY97. MFWP, Kalispell. (In prep)

Fisheries Program Officer: Brian Marotz

See Umbrella Proposal for Hungry Horse Fisheries Mitigation

Section 10. Information/technology transfer

Project results will be published in reports to BPA and, where applicable, peer reviewed journals. Quarterly progress reports are sent to all interested agency and citizens groups. Results of the program are frequently presented at professional meetings within and outside MFWP, and in the public arena through invited presentations, newsletters, and news coverage. MFWP currently supports a state-wide rivers database with information on streams, fisheries, species distribution, etc. This database is administered from within our office as is accessible through MFWP's Internet web site.

Congratulations!